# AbstractID: 5352 Title: The Small-Animal Radiation Research Platform (SARRP): Focused Pencil Beam Dosimetry

**Purpose:** A small animal radiation platform equipped with on-board cone-beam CT and conformal irradiation capabilities is being constructed for translational research. This work reports on the dosimetric characteristics of the x-ray lens subsystem used for high-resolution dose delivery.
**Method and Materials:** A constant voltage 225 kVp x-ray beam from a 0.4 mm focal spot is shaped and directed to enter a 1.5 cm long, 2 cm diameter cylindrical multi-layer graphite x-ray lens placed 16 cm downstream from the source. The lens emits a converging circular beam of 40-80 keV x-rays which forms a narrow cylindrical beam centered at 33.5 cm downstream with a length of approximately 5 cm in air. The pencil beam disperses further downstream. We measured dosimetry of the beam in water equivalent plastic using Gaf-chromic EBT films (<0.1 mm pixel size) over a SSD range of 30 to 33.5 cm in steps of 5 mm. For each SSD, 36 films were orientated orthogonal to the beam and at every 2 mm between slabs in the depth direction. We established the optical density-to-dose calibration with a 6 MV beam.
**Results:** The beam has a highly peaked cross-beam profile with a full width half maximum of about 1.5 mm in the focal zone. Irregular cylindrical symmetry is present due to imperfect lens construction. Dose deposition was defined as the average value over a circular area with a diameter of 1.5mm from the beam axis. Surface dose rates are 230 – 160 cGy/min over the 3.5 cm range of SSDs. The percent depth dose is approximately 34% at 2 cm depth for a beam at 33.5 cm SSD.
**Conclusion:** Highly localized dose can be delivered with the focused pencil beam. Work is on-going to improve dose uniformity by lens rotation, and to develop a pencil beam algorithm for planning purposes.